Superior performance/U in a 4-socket, 2U server with up to 64 processor cores

Product Guide
November 2011

IBM System x3755 M3

Product Overview

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Outstanding price/performance for mid-size workloads

Suggested Uses: *Businesses requiring a rack-optimized compute-dense server for business intelligence, midsized databases or virtualization, ERP, HPC, and the like.*

The challenge today is to squeeze as much performance out of your IT dollars as possible, while saving cost on features not needed. The **four-socket,** IBM® **System x3755 M3**, incorporating IBM **X-Architecture**™ features, meets that challenge. It was designed to eliminate system architecture bottlenecks through the use of separate, high-speed links between the processors, main memory and I/O. It is well suited for application workloads that benefit from a 4-processor system with outstanding price/performance, offering high compute density, large memory capacity, and high I/O throughput, all in a small rack footprint. Up to **21** x3755 M3 servers can be installed in a single 42U rack, offering the compute density of up to **84** processors (**1344** cores) per rack.

The x3755 M3 supports the latest **16-**, **12-** and **8-core** AMD **Opteron 6200** and **6100** series processors with DirectConnect Architecture and HyperTransport technology, to offer impressive computing power in a **2U** rack-optimized design. This server offers up to **64** processor cores, **high memory bandwidth**, and **high floating-point performance** at an affordable price. The x3755 M3 offers up to **512GB**[1] of industry-standard **DDR3** (**PC3-10600**) memory with **Chipkill**™ **ECC** (Error Checking and Correcting) protection—for high performance and reliability. For even higher levels of availability, the x3755 M3 also offers **online memory sparing**. **Two dual-port** integrated **Gigabit Ethernet** controllers are standard—offering **TOE** (TCP offload engine), **iSCSI**, and **RDMA** support, **load-balancing** and **failover** capabilities, along with **four** high-performance **PCIe Gen 2** adapter slots.

All models offer support for either **two** or **four processors** and a choice of high-performance hard disk drives with an internal storage capacity of up to **24TB**[2] (**eight 3.5-inch hot-swap SAS** or **SATA** HDDs). Alternatively, up to **18TB** (**six 3.5-inch simple-swap SATA** drives) is supported via the configure-to-order (CTO) process. The integrated **ServeRAID**™ **SAS** (Serial Attach SCSI)/**SATA** (Serial-attach ATA) controller provides hardware-based **RAID-0**/**1**/**10** or **RAID-0**/**1**/**10**/**5**/**50** support standard (model-specific). Additional RAID support is available via upgrade.

Standard in the x3755 M3 is an integrated Baseboard Management Controller (iBMC) that enables the user to manage and control the server easily—both locally and remotely. This high level of manageability is designed to keep costs down and the system up. **A pop-out/drop-down light path diagnostics panel** enables quick servicing of the system if a problem develops. These advanced features help maximize network availability by increasing uptime, as do integrated **RAID**; **temperature-controlled fans**; **IPMI 2.0** support, including **highly secure remote power control** and **Serial over LAN**; as well as **text-console redirect over LAN**.

Another improvement in the new generation of X-Architecture is the replacement of legacy BIOS with a new generation **Unified Extensible Firmware Interface** (UEFI). UEFI provides a more intuitive user interface and understandable event logs and better management.

With the inclusion of unique IBM service and support features such as **IBM Active Memory**™, the iBMC, UEFI, light path diagnostics, **IBM Systems Director**, **IBM ServerGuide**™, and others, the x3755 M3 is designed for maximum uptime.

If you need highly manageable, quad-socket/multi-core price/performer in a rack-dense 2U package, the x3755 M3 is the ideal system.

Selling Features

Price/Performance

The x3755 M3 offers numerous features to boost performance and reduce product and operating costs:

[1] Maximum memory and disk capacity may require the replacement of standard components with the largest supported component available. **512GB** capacity using **16GB** DIMMs requires a **4-processor** system in order to use all **64** sockets. In a two-processor configuration, only **16** total DIMM sockets are available; thus a two-processor system is limited to **256GB** of RAM (16 x 16GB).
[2] GB equals 1,000,000,000 bytes when referring to hard disk drive capacity. Accessible capacity may be less.

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- Up to **four 16-**, **12-** or **8-core** Opteron 6000 series processors with HyperTransport Technology, DirectConnect Architecture and **12MB** of integrated Level 3 cache per processor offer solid performance capable of tackling the toughest jobs.
- Each processor includes **4 integrated memory controllers** (one per memory channel), for up to **16 memory controllers per server**.
- **Energy-efficient processors** use less power and produce lest waste heat than less efficient processors, thus helping to reduce data center energy costs. For example, the 12-core 115W (maximum) processors *average* only 80W in typical use, which is under 7W per core.
- All x3755 M3 servers support 2 DIMMs per channel (**2DPC**) at 1333MHz.
- Fast **PC3-10600 DDR3** ECC memory with **Chipkill** error correction and **online memory sparing** protection provides speed and high availability.
- **Four** high-speed **PCIe Gen 2** adapter slots offer investment protection by supporting high-performance adapters, such as 10Gb Ethernet and InfiniBand™ cards.
- Integrated **ServeRAID** controllers support **RAID-0**/**1**/**10** or **RAID-0**/**1**/**10**/**5**/**50** standard (model-specific), upgradeable to **RAID-0**/**1**/**10**/**5**/**50**.
- Up to **24TB** of 3.5-inch **hot-swap SAS** or **SATA** storage offers high-performance with high availability, while up to **18TB** of **simple-swap** (via CTO) **SATA** storage offers low-cost with higher availability than fixed HDDs.
- **Two** integrated **dual-port Gigabit Ethernet** controllers with **IPMI 2.0** support provide 4 ports for high-speed network communications.
- Support for TCP Offload Engine (**TOE**), **iSCSI**, and **RDMA** offers higher performance for TCP/IP traffic, with less overhead on the system processor.
- A **high degree of device integration**—including quad Gigabit Ethernet, systems management and video controllers—lowers costs and frees up valuable adapter slots.

Flexibility

The x3755 M3 has the ability to grow with your application requirements, thanks to:

- A choice of Opteron processors with **1.7** through **3.0GHz** clock rates and **79**-**140W** maximum power draw (**65-105W** average).
- Up to **512GB** of high-speed DDR3 system memory (**128GB** *per processor*).
- Up to **eight hot-swap SAS** or **SATA** HDDs (up to **24TB SAS** or **SATA**), or up to **six** (via CTO) **simple-swap SATA** HDDs (up to **18TB**).
- **Three** *available* **high-performance** adapter slots (**one PCIe x16, one x8, one x4** in all models (plus **one x8** slot containing the ServeRAID controller).
- *Hardware-based* support for **RAID-0**/**1**/**10** (upgradeable to **RAID-5**/**50**) is provided standard in most models. Other models provide **RAID-0**/**1**/**10**/**5**/**50** standard (upgradeable with **RAID-6**/**60** and battery backup).
- The **five USB 2.0** ports are up to **40X** faster[3] than older **USB 1.1** ports. This provides speedy access to external HDDs (non-arrayed), optical drives, tape drives, and other USB devices. Two ports are on the front of the unit, one is internal, and two are on the back.

Manageability

Powerful systems management features simplify local and remote management of the x3755 M3:

- The x3755 M3 includes an integrated **Baseboard Management Controller (iBMC)** to monitor server availability, perform Predictive Failure Analysis, etc., and trigger IBM Systems Director alerts. The BMC enables service personnel to use sophisticated diagnostic tools, such as light path diagnostics and **Serial over LAN**, to resolve problems quickly. The remote presence feature offers remote control of keyboard, video, and mouse, graphical console redirection over LAN, remote virtual floppy and CD-ROM, plus the latest OS failure screen capture.
- Integrated **IPMI 2.0** support alerts IBM Systems Director to anomalous environmental factors, such as voltage and thermal conditions. It also supports **highly secure remote power control** using data encryption.
- **Text Console Redirection** support allows the administrator to remotely view x3755 M3 text messages over Serial or LAN.
- Integrated industry-standard Unified Extensible Firmware Interface (**UEFI**) next-generation BIOS. New capabilities include:
  - Human readable event logs — no more beep codes

[3] Data transfer rates may be less than the maximum possible.

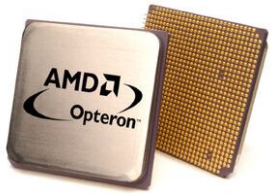
  - Complete out-of-band coverage by the Advance Settings Utility to simplify remote setup
  - A complete setup solution, allowing adapter configuration functions to be moved into UEFI
  - Consistent firmware management across an entire product line
- Integrated **Trusted Platform Module (TPM) 1.2** support.
- IBM Systems Director is provided for proactive systems management. It comes with a portfolio of tools. In addition, IBM Systems Director offers extended systems management tools for additional server management and increased availability.

Availability and Serviceability

The x3755 M3 provides many features to simplify serviceability and increase system uptime:

- x3755 M3 servers support **Chipkill-enabled** memory DIMMs. Chipkill memory is up to **16X** better than standard ECC memory at correcting memory errors. This can help reduce downtime caused by memory errors.
- The x3755 M3 offers **online memory sparing** for redundancy in the event of a noncorrectable memory failure.
- **Toolless cover removal** provides easy access to upgrades and serviceable parts. Similarly, the **DIMMS**, **HDDs**, **system battery**, and **adapters** can be installed and replaced without tools. This means less time (and therefore less money) spent servicing the x3755 M3. Additionally, **hot-swap/redundant HDDs, fan modules** and (optional via CTO) **power supplies** mean greater system uptime while these components are being serviced.
- New **toolless slides** ship with the server, together with a **Cable Management Arm (CMA)**, that allow the rack server to easily slide into place
- IBM **Thermal Diagnostics** allows the administrator to evaluate thermal data on the server without taking the hardware offline. This can provide greater server uptime.
- The **drop-down light path diagnostics panel** and individual light path LEDs quickly lead the technician to failed (or failing) components. This simplifies servicing, speeds up problem resolution and helps improve network availability.
- The **integrated 6Gbps** RAID controller enhances system availability and data.
- **IPMI 2.0** supports highly secure remote system power control using data encryption. This allows an administrator to restart a server without having to visit it in person, saving travel time and getting the server back up and running quickly and securely. It also adds new features to those provided by IPMI 1.5, including **VLAN** support, **Serial over LAN**, enhanced authentication and encryption algorithms (**RMCP+** and **AES**) and a **firmware firewall**.
- **Temperature-controlled hot-swap redundant fans** adjust to compensate for changing thermal characteristics. At the lower speeds they draw less power and suffer less wear. Equally important in a crowded data center, temperature-controlled fans produce less ambient noise in the data center than if they were constantly running at full speed. (Nonredundant simple-swap fans are available via CTO.)
- Standard or optional (model-specific) **hot-swap/redundant power supplies** providing **N+N** or **N+1** redundancy (up to three PSes).
- The **three-year (parts and labor) limited onsite warranty**[4] helps afford you peace of mind and greater investment protection than a one-year warranty does.

Key Features



High-Performance Multi-Core Opteron Processors

The x3755 M3 supports up to four high-performance 16-, 12-, or 8-core AMD Opteron 6200 or 12-, or 8-core Opteron 6100 series processors in only 2U of rack space. The x3755 M3 offers a choice of processors:

Opteron 6200

- **140W** maximum (105W average) **16-core** Opteron **6282SE** operating at 2.6Ghz with *very low power draw per core* (**8.75W**), **6.4** GTps (gigatransfers per second), **1333MHz** memory access, quad integrated memory controllers, and **16MB** of **L3** processor cache (**1MB** per core)
- **115W** maximum (80W average) **16-core** Opteron **6276**, **6274***, or **6272** operating at 2.3, 2.2, or 2.1GHz (respectively) with *very low power draw per core* (**7.2W**), **6.4** GTps (gigatransfers per second), **1333MHz** memory access, quad integrated memory controllers, and **16MB** of **L3** processor cache (**1MB** per core)

[4] For terms and conditions or copies of the IBM Statement of Limited Warranty, call 800-772-2227 in the U.S. In Canada call 800-426-2255. Telephone support may be subject to additional charges. For warranties including onsite labor, a technician is sent after IBM attempts to resolve the problem remotely. International warranty service is available in any country in which this product is sold.

- **85W** maximum (65W average) **16-core** Opteron **6262HE** operating at 1.6Ghz with *extremely low power draw per core* (**5.3W**), **6.4** GTps (gigatransfers per second), **1333MHz** memory access, quad integrated memory controllers, and **16MB** of **L3** processor cache (**1MB** per core)
- **115W** maximum (80W average) **12-core** Opteron **6238***, or **6234** operating at 2.6, or 2.4GHz (respectively) with *very low power draw per core* (**9.6W**), **6.4** GTps (gigatransfers per second), **1333MHz** memory access, quad integrated memory controllers, and **16MB** of **L3** processor cache (**1.33MB** per core)
- **115W** maximum (80W average) **8-core** Opteron **6220**, or **6212*** operating at 3.0, or 2.6GHz (respectively) with *low power draw per core* (**14.4W**), **6.4** GTps (gigatransfers per second), **1333MHz** memory access, quad integrated memory controllers, and **16MB** of **L3** processor cache (**2MB** per core)

Opteron 6100

- **137W** maximum (105W average) **12-core** Opteron **6180SE*** or **6176SE*** operating at 2.5 or 2.3Ghz (respectively) with *low power draw per core* (**11.4W**), **6.4** GTps (gigatransfers per second), **1333MHz** memory access, quad integrated memory controllers, and **12MB** of **L3** processor cache (**1MB** per core)
- **115W** maximum (80W average) **12-core** Opteron **6176***, **6174**, **6172**, or **6168*** operating at 2.3, 2.2, 2.1, or 1.9GHz (respectively) with *very low power draw per core* (**9.6W**), **6.4** GTps (gigatransfers per second), **1333MHz** memory access, quad integrated memory controllers, and **12MB** of **L3** processor cache (**1MB** per core)
- **79W** maximum (65W average) **12-core** Opteron **6164HE*** operating at 1.7GHz, with *extremely low power draw per core* (**9.9W**), **6.4** GTps, **1333MHz** memory access, quad integrated memory controllers, and **12MB** of **L3** processor cache (**1.5MB** per core)
- **115W** maximum (80W average) **8-core** Opteron **6140***, **6136**, **6134** or **6128** operating at 2.6, 2.4, 2.3, or 2.0GHz (respectively), with *low power draw per core* (**14.4W**), **6.4** GTps, **1333MHz** memory access, quad integrated memory controllers, and **12MB** of **L3** processor cache (**1.5MB** per core)
- **79W** maximum (65W average) **8-core** Opteron **6128HE*** or **6124HE** operating at 2.0 or 1.8GHz (respectively), with *very low power draw per core* (**9.9W**), **6.4** GTps, **1333MHz** memory access, quad integrated memory controllers, and **12MB** of **L3** processor cache (**1.5MB** per core)—available via CTO only

* Available via configure-to-order only.

System power-efficiency is crucial for businesses looking to increase their computing strength to spread the workload without outgrowing their current data center. With the power-efficient AMD Opteron dual-core processors, increased performance-per-watt improves compute capacity within the same infrastructure space. By replacing old Opteron processor-based servers with new x3755 M3 servers using the new power-efficient processors, you can reduce the number of servers needed by up to **67.5%**, with equivalent performance and as much as a **534%** power reduction. Or, you can nearly double the performance in the same space while still saving on power, when implementing a one-to-one server replacement.

HyperTransport technology is a high-speed, low-latency, point-to-point link, designed to increase the communication speed between circuits. It permits the fastest possible access to CPU and memory. The x3755 M3 incorporates the latest version of HyperTransport technology (3.0) which provides coherent bandwidth (among processors) of up to **6.4** gigatransfers per second (**GTps**) and noncoherent bandwidth (between processors and I/O) of up to **5.2GTps**. Go to *http://amd.com* for more information on HyperTransport technology.

AMD PowerNow! technology with optimized power management dynamically reduces processor power draw based on workload. This can result in a power savings of up to **55%** per processor at CPU idle.

DDR3 ECC Memory with Chipkill Protection

x3755 M3 servers use registered double data rate III (DDR3) DIMMs and provide Active Memory features, including advanced **Chipkill** memory protection, for **up to 16X** better error correction than standard ECC memory, and optional **online memory sparing**. In addition to offering **triple the memory bandwidth** of registered DDR2 or fully-buffered memory, DDR3 memory also uses less energy. DDR2 memory already offered up to **37%** lower energy use than fully buffered memory. Now, a generation later, DDR3 memory is even more efficient, using **10-15% less energy** than DDR2 memory.

The x3755 M3 supports up to **32** RDIMMs (**512GB** using RDIMMs; **128GB** using UDIMMs), with **8** DIMM slots assigned to each processor (four memory channels with two DIMM slots and one memory controller per channel). Therefore a 2-processor system is limited to **16** DIMMs. Four processors are required to use all 32 DIMM slots. Memory types supported include single-, dual-, and quad-rank, **1.5V** and energy-efficient **1.35V** DIMMs. 1.35V DIMMs consume up to **18%** less energy than 1.5V DIMMs.

Notes: Memory is available in **2GB**, **4GB**, **8GB**, or **16GB RDIMMs**, or **2GB** or **4GB UDIMMs**. The x3755 M3 supports **single**- and **dual-rank UDIMMs**, or **single**-, **dual-**, and **quad-rank RDIMMs**. Mixing UDIMMs and RDIMMs in the same server is *not* supported. It is strongly recommended that memory be installed in pairs, for load-balancing purposes. The DIMMs within a pair must be identical (capacity, rank, and speed). Chipkill protection is offered with either x4 or x8 DIMMs.

The x3755 M3 supports up to two DIMMs per channel (2DPC) running at 1333MHz, depending on the configuration. Memory configurations include:

- **2DPC** — Single- and dual-rank 1.5V and 1.35V at **1333MHz**
- **2DPC** — 2 quad-rank, or 1 quad-rank and 1 single- or dual-rank 1.5V at **1066MHz**; 1.35V at **800MHz**
- 1DPC — Single- and dual-rank 1.5V and 1.35V at **1333MHz**
- 1DPC — Quad-rank 1.5V at 1333MHz; 1.35V at **1066MHz**
- Maximum of **256GB** of RDIMM memory at **1333MHz** (16 x 16GB DIMMs or 32 x 8GB DIMMs); **512GB** of RDIMM memory at **1066MHz** (32 x 16GB DIMMs)
- Maximum of **128GB** of UDIMM memory at **1333MHz** (32 x 4GB DIMMs)

With **online sparing** enabled one rank of each pair is configured as a spare. These spare ranks are used in the event of a DIMM failure. (All ranks must be the same size.) Using online sparing, only **1**/**2** of the memory is available for use with *two single-rank* DIMMs in a memory channel; with *one single-rank* DIMM and *one dual-rank* DIMM, only **2**/**3** of the memory is available (for example, a 4GB single-rank DIMM and an 8GB dual-rank DIMM). **3**/**4** of the memory is available with *two dual-rank* DIMMs. (Online sparing is not available with quad-rank DIMMs.)

High-Performance Adapter Slots

The x3755 M3 provides **four high-speed PCI Express** (PCIe) **Gen 2** adapter slots to fit a variety of needs. PCI Express Gen 2 is the latest high-performance, low-latency, next-generation serial I/O bus. **One x16** physical/**x16** electrical ("by 16") **16GBps full-**length/**full-**height slot (Slot **1**) supports **x1**/**x4**/**x8**/**x16** Gen 1 or Gen 2 cards at full rated throughput. **Two x8** physical/**x8** electrical **8GBps half-**length/**low-profile** slots (Slots **2** and **4**) support **x1**/**x4**/**x8** Gen 1 or Gen 2 cards at full rated throughput. **One x8** physical/**x4** electrical **4GBps half-**length/**low-profile** slot (Slot **3**) supports **x1**, **x4**, and **x8** Gen 1 or Gen 2 cards, but at a maximum of **x4** Gen 2 throughput. Slot **4** is reserved for the RAID controller.

Drive Bays

The x3755 M3 contains **nine** drive bays in all (one 5.25-inch and eight 3.5-inch) standard. All models support **hot-swap SAS**/**SATA** drives. This enables up to **eight** SAS or SATA drives to be installed. A **simple-swap SATA** option is available via CTO only, supporting up to **six** HDDs and one **3.5-inch tape drive**..

An additional bay supports an optional 5.25-inch **optical** drive with a SATA interface. No floppy drive is supplied with any model; an external USB floppy drive may be used, if needed.

Large HDD Storage Capacity

The x3755 M3 offers a choice of disk storage, supporting up to **eight 3.5-inch hot-swap SAS** or **SATA,** or **six 3.5" simple-swap** 6Gbps drives:

3.5-inch Hot-Swap SAS

- **7,200** RPMs — 1 or **2TB** (**16TB**)
- **7,200** RPMs – **3TB** (**24TB**)

3.5-inch Hot-Swap SATA

- **7,200** RPMs — 250 or **500GB**, 1, 2, or **3TB** (**24TB**)

3.5-inch Simple-Swap SATA

- **7,200** RPMs – 2 or **3TB (18TB)**

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Disk and Tape Controllers

All models include an integrated IBM **ServeRAID-M1015** or **ServeRAID-M5015** SAS/SATA Controller (model-specific) in a dedicated PCIe slot. Supported controllers include:

- The **6Gbps** (x8 PCIe) **ServeRAID-M1015 SAS/SATA** controller — **RAID-0**/**1**/**10** (no cache) for up to **32** drives (limited to available bays). The **IBM ServeRAID M1000 Series Advance Feature Key** adds **RAID-5** support.
- The **6Gbps** (x8 PCIe) **ServeRAID-M5014 SAS/SATA** controller — enhanced performance with **256MB** of cache memory, and supports optional **RAID-0**/**1**/**10**/**5**/**50** for up to **32** drives (limited to available bays).
- The **6Gbps** (x8 PCIe) **ServeRAID-M5015 SAS/SATA** controller — enhanced performance with **512MB** of cache memory and battery backup, and supports **RAID-0**/**1**/**10**/**5**/**50** for up to **32** drives (limited to available bays).
- The **ServeRAID M5000** Series Advance Feature Key adds **RAID-6**/**60** with self-encrypting drives (**SED**) support to the **M5014** and **M5015**. The ServeRAID M5000 Series Battery Key adds battery backup support to the **M5014**.
- **6Gbps SAS HBA** controller for SAS tape drive support

Removable Storage

All models support internal or external removable storage. Supported drives include:

- **DDS Gen 5** (internal SATA)—for simple-swap systems only
- **DDS Gen 5** or **6** (no internal USB)
- **RDX** Removable Disk Cartridge (external USB)
- **RDX** Removable Disk Cartridge (internal SATA via CTO only)

Dual Gigabit Ethernet Controllers

The x3755 M3 includes **two dual-port** integrated **Broadcom BCM5709C** Gigabit Ethernet controllers with **TOE**, and **RDMA** support, as well as **load-balancing** and **failover** capabilities, with up to 10X higher maximum throughput than a 10/100 Ethernet controller.

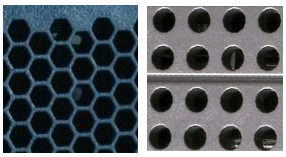
It also supports highly secure remote power management using **IPMI 2.0**, plus **Wake on LAN®** and **PXE** (Preboot Execution Environment) flash interface. Optional PCI adapters offering failover and load balancing between adapters are available for added throughput and increased system availability.

Ultra-Efficient Cooling

Strategically located fans, combined with efficient airflow paths, provide highly effective system cooling for the x3755 M3. The server includes **five hot-swap** fans standard. These offer failover capability. (The option of nonredundant fans is available via CTO.) In addition, each power supply contains a fan.

The system contains **two cooling zones**. **Zone 1** (incorporating four fans) cools the processors and their associated memory. **Zone 2** (one fan) cools the adapter slots.

The fans automatically adjust speeds in response to changing thermal requirements, from the minimum speed to a maximum of 16,000 RPMs, depending on the zone and internal temperatures. When the temperature inside the server increases, the fans speed up to maintain the proper ambient temperature. When the temperature returns to a normal operating level, the fans return to their default speed. Why not simply run the fans at 100% capacity all the time? For several good reasons: to reduce the ambient noise, reduce the wear-and-tear on the fans and reduce the server power draw. The reduction in ambient noise and power draw may be relatively minor for a single server, but put dozens or hundreds in a data center and it can make a big difference.



In addition, the server uses **hexagonal ventilation holes** in the chassis. Hexagonal holes can be grouped more densely than round holes, providing greater airflow through the system cover.

This cooling scheme is important because newer, more powerful processors generate a significant amount of heat, and heat must be controlled for the system to function properly.

Hot-Swap/Redundant Components

System availability is maximized through the extensive use of hot-swap and redundant components, including:

- Redundant **memory** protection (with **Chipkill** and/or **online memory sparing** enabled)
- Hot-swap, redundant **hard disk drives** (with **RAID-1**/**10** or **1**/**10**/**5**/**50** protection standard and **RAID-5** or **6**/**60** optional)

- Hot-swap, redundant **power supplies** (standard or optional)—Energy Star-compliant / 80+ Gold; up to **92%** efficient; up to 3 supported
- Hot-swap, redundant **cooling fans**

Light Path Diagnostics

Light path diagnostics enables a technician to quickly identify and locate a failed or failing system component, such as a specific fan or memory DIMM. This enables quick replacement of the component, which helps increase server uptime and lower operating costs.

The front of the server has an LED indicator light to show possible component failures. If the front LED indicates an error condition, by pressing a button on the front of the server an LED panel will pop out and drop down for easy viewing without the need to open the server cover or remove the server from the rack. The light path diagnostics panel tells the servicer which component requires attention. In addition, many components have their own identifying LEDs. For example, each of the memory modules has an LED next to the DIMM slot, as do all processors, all adapter slots, all fans, the power supply, the voltage regulator modules and the service processor. This allows the servicer to easily identify exactly which component needs servicing. By following the "light path," the component can be replaced quickly, and without guesswork. (***Note:*** In the event of a failed DIMM or processor, the system will restart and mark the component as bad while offline, thus allowing the system to continue running, with reduced capacity, until serviced.)

Other Features

- **Trusted Platform Module standard** — This module provides a highly secure start-up process from power-on through hand-off to the operating system boot loader. ACPI support is provided to allow ACPI-enabled operating systems to access the security features of this module. (TCG V1.2-compliant.)
- **Five USB 2.0 ports** — Provides flexibility to add high-speed external devices. The USB 2.0 specification supports up to 480Mbps transfer rates. (***Note:*** Not all USB 2.0 devices are capable of achieving this rate.) **Two** ports are provided on the front of the server, **two** are on the back, and **1** is internal to support an optional flash memory key with embedded hypervisor, or internal tape drive.
- **Toolless slides** — Allows quick rack installation and quicker upgrade and servicing of the server.
- **Toolless chassis** — The cover can be opened without tools, and many components can be added or replaced without tools, including processors, DIMMs, hot-swap HDDs, PCIe adapters, an optional optical drive, and the integrated or optional ServeRAID controller. This can save a servicer significant time.

Advanced Systems Management Capabilities

The x3755 M3 has a high level of systems management capabilities that are well-suited to remote locations as well as to stand-alone environments. Features include the UEFI, an integrated Baseboard Management Controller (iBMC) with remote presence, IBM ToolsCenter, IBM Systems Director Active Energy Manager, Automatic Server Restart, Wake on LAN support, PXE support, text console redirect, Predictive Failure Analysis, and IBM Systems Director.

The iBMC provides industry-standard **Intelligent Platform Management Interface** (**IPMI**) **2.0**-compliant systems management. It provides a number of important system functions, including:

- Monitoring of system and battery voltage, system temperature, fans, power supplies, processor and DIMM status
- Fan speed control
- Product ID and Family ID detection
- Highly secure remote power on/off
- System reset control
- NMI/SMI detection and generation
- System diagnostic LED control (power, HDD, activity, alerts, heartbeat)
- IPMI over LAN
- Serial Over LAN
- Proxy server support
- LAN messaging and alerting
- Text console redirection over LAN
- Predictive Failure Analysis for system fans
- Web-based out-of-band control

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- SSL (Secure Socket Layer) and LDAP (Lightweight Directory Access Protocol) support
- Enhanced authentication and encryption algorithms (RMCP+, AES)
- Local update of iBMC firmware
- Firmware firewall
- Support for IPMI v2.0 compliant management software (e.g., xCAT)
- Other mandatory and optional IPMI iBMC functions

The iBMC alerts IBM Systems Director to anomalous environmental factors, such as voltage and thermal conditions—even if the server has failed.

The iBMC remote presence feature offers additional systems management capabilities, including:

- Graphical console redirection over LAN
- Remote virtual floppy and CD-ROM
- High-speed remote redirection of PCI video, keyboard and mouse

IBM **ToolsCenter** consolidates 42 needed tools for managing servers individually into an integrated suite of 8 tools. They are organized by function: deployment, updates, configuration and diagnostics. Tools are now simpler to access and use with a single webpage for access, a common look and feel and a common command line interface for the scripting tools. The ToolsCenter **Bootable Media Creator** offers significantly more functionality than past tools with the ability to add more tools to the bootable image and to automatically download the bootable environment if needed. Bootable Media Creator allows you to create bootable CDs, DVD, and USB keys for updates customized to your systems.

Automatic Server Restart (ASR) helps reduce downtime by restarting the server automatically in the event of a system lockup. If the operating system crashes or the hardware freezes, it automatically triggers the ASR hardware, which immediately restarts the server (and logs an ASR event with IBM Systems Director). These features are designed so that *no more than five minutes can pass before the server is restarted*.

Wake on LAN permits the server to be remotely powered on if it has been shut off. Once powered up, the server can be controlled across the network, using the **Preboot Execution Environment** (PXE).

Like Wake on LAN, PXE is system firmware. It enables management software to take control of a system before the BIOS, operating system or applications are loaded (using Wake on LAN/PXE) and lets an administrator perform many low-level tasks remotely that would otherwise require a visit to each system. These tasks may include such things as formatting a hard disk drive, updating system firmware, or deploying a Windows or Linux operating system.

Text and Graphical Console Redirection support allows the administrator to remotely view system text messages and graphics over serial or LAN.

Predictive Failure Analysis (PFA) is designed to allow the x3755 M3 to detect impending failure of supported components (processors, memory, power supplies, fans, and hard disk drives) *before* actual failure, and alert the administrator through IBM Systems Director. This gives you the ability to replace the failing component *before* it fails, resulting in increased uptime.

IBM Systems Director software for advanced workgroup management is included standard. IBM Systems Director comes with a portfolio of tools, including Active Energy Manager. Systems Director provides a single uniform graphical interface for all of these systems management functions. IBM Systems Director enables you to customize thresholds and monitor system components (for things like temperature, voltage regulation, etc.) to help maximize uptime.

Extensive System Support Features

The IBM services and technical support portfolio provides world-class, consistent, high-quality service and support. The x3755 M3 offers a number of tools and services designed to make ownership a positive experience. From the start, IBM programs make it easier for you to plan for, configure and purchase System servers, get them running and keep them running long-term. These features include IBM ServerProven, the IBM Standalone Solutions Configuration Tool, IIBM ServerGuide, Product Customization Services and extensive technical support offerings.

The IBM **ServerProven** program provides the confidence that specific options and operating systems have been tested on the server and are officially supported to work together. It is updated frequently to ensure that the latest compatibility information is always at your fingertips.

The IBM **Standalone Solutions Configuration Tool** (SSCT) is a downloadable tool that simplifies the often complex chore of configuring a full rack of servers (including blade servers) and confirming that you have all the cables, power distribution units, KVM (keyboard, video and mouse) switch boxes and other components you need, as well as the proper airflow clearances, electrical circuits and other environmental conditions.

IBM **ServerGuide** (installed from CD) simplifies the process of installing and configuring System

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x and BladeCenter servers. ServerGuide goes beyond mere hardware configuration by assisting with the automated installation of the Microsoft® Windows® Server 2008 operating systems, device drivers and other system components, with minimal user intervention. (Drivers are also included for support of Novell NetWare, Red Hat Linux and SUSE LINUX.) This focus on deployment helps you reduce both your total cost of ownership and the complexity that administrators and technical personnel face.

Additional services include hardware warranty upgrades and factory-installed **Product Customization Services** (PCS), such as asset tagging, hardware integration, software imaging and operating systems personalization.

IBM offers extensive industry-leading **technical support** by phone and via the Web. Support options include links to forums/newsgroups, problem submission, online shopping support, service offerings, device drivers for all IBM product lines, software downloads and even upcoming technical seminar worldwide schedules and registration. Also available are remote installation, configuration and usage support for System x hardware and software, as well as onsite custom services to provide the level of expertise you require.

IBM Maintenance and Technical Support solutions can help you get the most out of your IT investment by reducing support costs, increasing availability and simplifying management with integrated support for your multiproduct, multivendor hardware and software environment. For more information on hardware maintenance, software support, solution support and managed support, visit http://**ibm.com**/services/maintenance.

Key Options

IBM options for System x servers help you take your servers to a higher level

You can rely on System x options to supply a complete solution for your business needs. Options help you create an optimized server system to meet your data protection, storage and availability needs. Every IBM option is designed and tested for peak performance and flexibility, helping to maximize your return on investment. The combination of System x servers and options lets you keep your fingers on the pulse of you e-business.

Processors — The AMD Opteron 6200 or 6100 series processors provide 16, 12, or 8 cores, a large cache and four integrated memory controllers. DirectConnnect Architecture and a large cache, combined with fast **1333MHz** memory access, reduces memory latency and facilitates the movement of data through the processor and I/O devices. (***Note:*** System performance depends not only on the number of processors in the server but also on the power and functionality of each processor.) Adding additional processors may be a cost-effective way to achieve significant performance improvements. Systems that come standard with two processors can be upgraded to four.

Memory — Memory is a significant factor in systems application performance. Adding more memory to a System x server is one of the most effective ways to increase application performance. For best performance in a server with 16-core processors, there should be twice as much memory available as for an 8-core processor. The x3755 M3 takes memory upgrades in pairs and provides two-way interleaving. (***Note:*** Each processor enables 8 DIMM slots.)

Power Supplies — With two processors installed, the optional 1100W second power supply for the x3755 M3 enables redundancy for hot-swap power. When four processors are installed with supported configurations, one hot-swap power supply is required; a second provides redundancy.

Fans — **Hot-swap/redundant** fans are provided standard. **Nonredundant** fans are available as an alternative, via the configure-to-order process only.

Hard Disk Drives — IBM hard disk drives help customers improve the transaction and cost performance of their System x servers. The choice of hard disk drives can be a critical aspect of maximizing the I/O throughput of the system. **Hot-swap SAS** hard disk drives (3.5-inch) are available for the x3755 M3 in capacities of up to **2TB** at **7,200** RPMs and **3TB** at **7,200** RPMs. **Hot-Swap SATA** hard disk drives (3.5-inch) are available in capacities of up to **3TB,** at **7,200** RPMs. **Simple-Swap SATA** hard disk drives (3.5-inch) are available in capacities of up to **3TB**, at **7,200** RPMs.

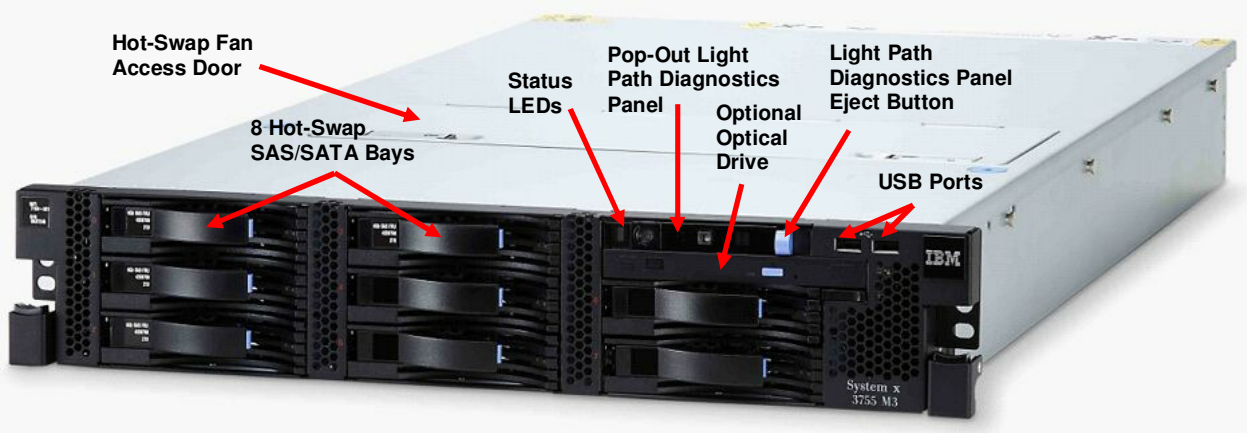
IBM ServeRAID Controllers — System x servers using ServeRAID technology allow companies to build a reliable foundation for business-critical computing. IBM ServeRAID technology allows an array consisting of multiple physical hard disk drives to be treated as one logical drive. ServeRAID technology also allows data to be stored redundantly, across multiple hard disk drives— enhancing both the integrity and the availability of the data. SAS and SATA ServeRAID controllers offer enhanced performance due to onboard processors and cache. Because IBM ServeRAID controllers can help significantly improve data transfer rates, this technology is extremely effective when implementing demanding, transaction-oriented applications. By employing the advanced fault tolerance of IBM ServeRAID technology, companies can effectively implement networked business systems that require large amounts of storage space for data and applications that must be available for their businesses to continue operating.

The IBM **ServeRAID-M1015**, x8 PCIe and **6Gbps**, offers RAID-0/1/10; optionally RAID-5/50 with

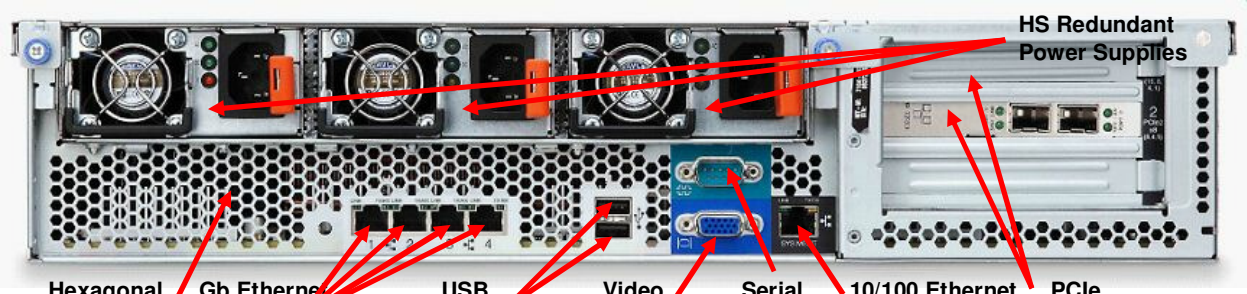
SED support. The IBM **ServeRAID-M5014**, x8 PCIe and **6Gbps**, provides **256MB** cache and RAID-0/1/10/5/50; optionally RAID-6/60 with SED, and battery backup). The IBM **ServeRAID-M5014**, x8 PCIe and **6Gbps**, provides **256MB** cache and RAID-0/1/10/5/50; optionally RAID-6/60 with SED, and battery backup). The IBM **ServeRAID-M5015**, x8 PCIe and **6Gbps**, has **512MB** cache and RAID-0/1/10/5/50; optionally RAID-6/60 and battery backup. The **IBM ServeRAID M1000 Series Advance Feature Key** adds **RAID-5/50** support to the ServeRAID-M1015. Similarly, the **IBM ServeRAID M5000 Series Advance Feature Key** adds **RAID-6/60** and **SED** support to the M5014 and M5015. The **IBM ServeRAID M5000 Series Battery Key** adds **battery backup** support to the M5014.

x3755 M3 Images

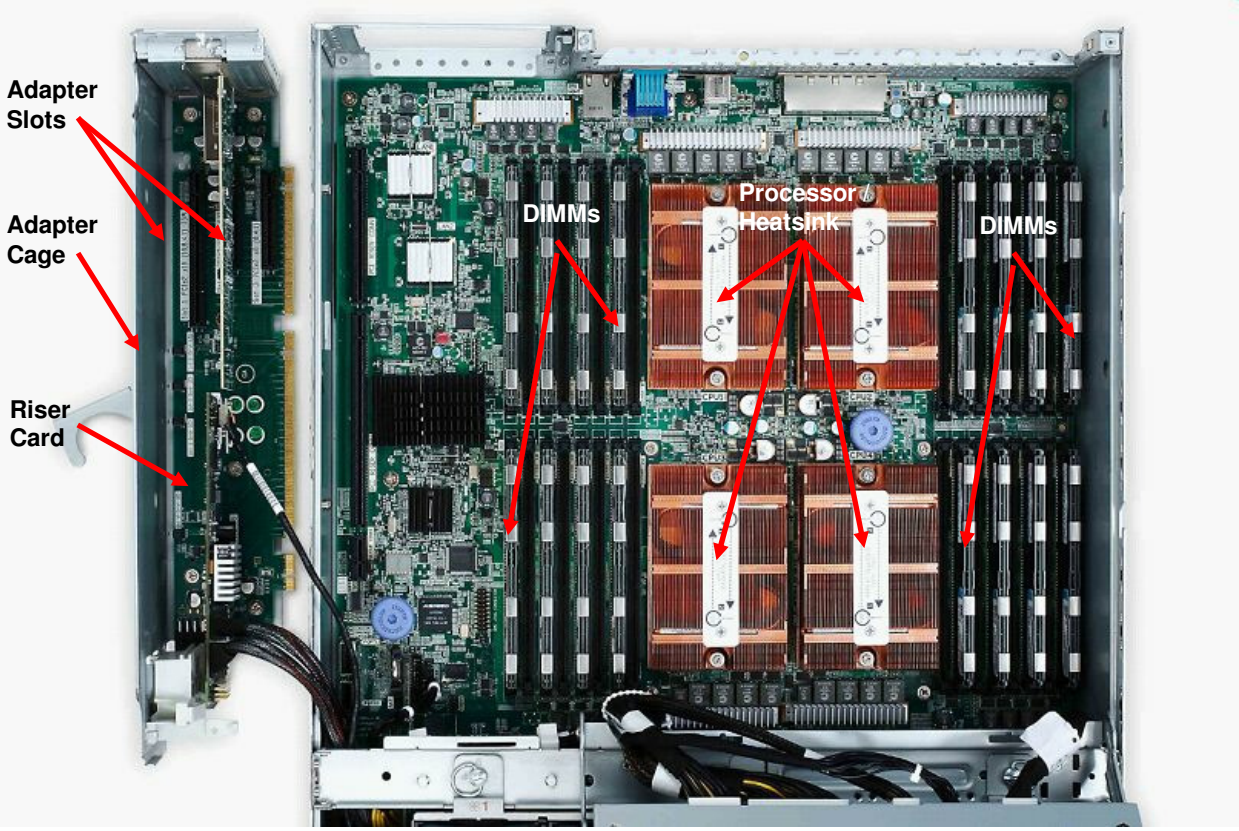
Front View



Rear View



Interior View



x3755 M3 Specifications					
Machine type	**7164-22x, 32x, 42x, 52x, 62x, 72x, A2x, B2x, D2x, G2x, J2x, L2x**				
Form factor	2U				
Processor type	**16-core** AMD Opteron **(62xx Series)** **1.6GHz** 6262HE (**L2x**), **2.1GHz** 6272 (**D2x**), **2.2GHz** 6274 (CTO), **2.3GHz** 6276 (**B2x**), **2.6GHz** 6282 SE (**A2x**)		**12-core** AMD Opteron **(62xx Series)** **2.4GHz** 6234 (G2x), **2.6GHz** 6238 (CTO)	**8-core** AMD Opteron **(62xx Series)** **2.6GHz** 6212 (CTO), **3.0GHz** 6220 (J2x)	
			12-core AMD Opteron **(61xx Series)** **1.7GHz** 6164HE (CTO), **1.9GHz** 6168 (CTO), **2.1GHz** 6172 (**62x**), **2.2GHz** 6174 (**72x**), **2.3GHz** 6176 (CTO), **2.3GHz** 6176SE (CTO), **2.5GHz** 6180SE (CTO)	**8-core** AMD Opteron **(61xx Series)** **1.8GHz** 6124HE (CTO), **2.0GHz** 6128 (**22x**), **2.0GHz** 6128HE **32x**), **2.4GHz** 6134 (**42x**), **2.4GHz** 6136 (**52x**), **2.6GHz** 6140 (CTO)	
Maximum processor power draw	**140W** (105W average)—A2x	**137W** (105W average)—6176SE/ 6180SE via CTO	**115W** (80W average)—22x/42x/52x/62x/ 72x/B2x/D2x/ G2x/J2x, and 6140/6168/ 6176/6212/ 6238/6274 via CTO	**85W** (65W average)—L2x	**79W** (65W average)—32x, and 6124HE/ 6164HE (via CTO)

x3755 M3 Specifications				
Maximum power draw per core	**14.4W** (22x, 42x, 52x, J2x, 6212)	**9.9W** (32x, 6124HE)	**8.75W** (A2x)	**6.6W** (6164HE)
	11.4W (6176SE)	**9.6W** (62x, 72x, G2x, 6168, 6238)	**7.2W** (B2x, D2x, 6274)	**5.3W** (L2x)
HyperTransport link speed	**6.4GHz** coherent (among processors); **5.2GHz** noncoherent (between processor and I/O)			
# of processors standard / maximum	**2** / **4** (22x, 42x, 62x)		**4/4** (32x, 52x, 72x, A2x, B2x, D2x, G2x, J2x, L2x)	
Internal L2 / L3 processor cache	**512KB L2** per core / **12MB L3** (shared per socket)—**6100** series		**2MB L2** (shared per 2 cores) / **16MB L3** (shared per socket)—**6200** series	
Chipset	AMD SR5690 and SP5100			
Standard memory[5]	**32GB** (4 x 8GB)—A2x, B2x, D2x, G2x, J2x, L2x	**16GB** (4 x 4GB)—32x, 52x, 62x, 72x	**8GB** (2 x 4GB)—22x, 42x	
Maximum memory	**512GB @ 1066MHz** (32 x 16GB RDIMMs)	**256GB @ 1333MHz** (16 x 16GB or 32 x 8GB RDIMMs)	**128GB @ 1333MHz** (32 x 4GB UDIMMs)	
Standard memory type	PC3-10600 (**1333MHz**) DDR3 ECC, 4GB 1Rx4			
Memory interleaving	Yes (two-way)			
DIMM capacities supported	2GB, 4GB, 8GB, or 16GB RDIMM		2GB or 4GB UDIMM	
DIMM types supported	**RDIMMs** 2GB 1R**x8** 1333GHz 1.5V LP 2GB 1R**x8** 1333GHz **1.35V** LP 4GB **2R**x4 1333GHz 1.5V LP 4GB 1Rx4 1333GHz 1.5V LP 4GB 1Rx4 1333GHz **1.35V** LP 8GB **2R**x4 1333GHz 1.5V LP 8GB **2R**x4 1333GHz **1.35V** LP 16GB 4Rx4 **1066GHz 1.35V** LP		**UDIMMs** 2GB 1R**x8** 1333GHz LP 4GB **2Rx8** 1333GHz LP	
# of DIMM sockets total / available	**32** / **28** (32x, 52x, 62x, 72x)—8 sockets per processor		**32** / **30** (22x, 42x, A2x, B2x, D2x, G2x, J2x, L2x)—8 sockets per processor	
2 DIMMs per Channel (2DPC) support	Yes (up to **256GB** at 2DPC) at 1333MHz			
Online memory sparing supported / # of DIMM sockets reserved for sparing	Yes / 1 rank per channel (4 channels per processor)			
Memory mirroring supported / # of DIMM sockets reserved for mirroring	N/A			
# of drive bays total / available	**9** / **9**—22x, 32x, 42x, 52x, 62x, 72x, A2x, B2x, D2x, G2x, J2x, L2x		**8** / **8**—via CTO only	
# of HDD drive bays total / available	**8** / **8** 3.5-inch **hot-swap**—22x, 32x, 42x, 52x, 62x, 72x, A2x, B2x, D2x, G2x, J2x, L2x		**6** / **6** 3.5-inch **simple-swap** 3.5-inch via CTO only	
# of 5.25-inch bays total / available	1 / 1 (optical drive optional)			
# of 3.5-inch tape drive bays total / available	1 / 1 (optional)			
Maximum HDD capacity	**24TB** (8 x 3TB) **hot-swap SAS/SATA** 3.5-inch—22x, 32x, 42x, 52x, 62x, 72x, A2x,		**12TB** (6 x 2TB) **simple-swap SATA** 3.5-inch—via CTO only	

[5] Maximum memory and disk capacity may require the replacement of standard components with the largest supported component available.

x3755 M3 Specifications			
	B2x, D2x, G2x, J2x, L2x		
HDD capacities supported	**3.5-inch HS SAS** **1TB** — **15K** RPMs; 2, **3TB** — **7.2K** RPMs	**3.5-inch HS SATA** 250GB, 1, 2, **3TB** — **7.2K** RPMs	**3.5-inch SS SATA** 2, **3TB** — **7.2K** RPMs
# of HDDs standard	None		
# of optical drives standard	None		
# of diskette drives standard	None (optional external USB)		
Removable storage supported	**Internal** DDS Gen **5** (SATA, simple-swap only)	**External** RDX Removable Disk Cartridge (USB)	
Disk drive technology	Hot-swap SAS/SATA — 22x, 32x, 42x, 52x, 62x, 72x, A2x, B2x, D2x, G2x, J2x, L2x	Simple-Swap SATA—via CTO only	
Integrated disk controller	8-port SAS RAID		
# of disk drives supported *per port*	1		
External disk drives supported	Yes, via adapter		
Integrated RAID controller standard	**ServeRAID-M1015** (x8 PCIe, no cache, RAID-0/1/10; optional RAID-5)—22x, 32x, 42x, 62x, D2x, G2x, J2x, L2x	**ServeRAID-M5015** (x8 PCIe, 512MB cache, battery, RAID-0/1/10/5/50; optional RAID-50/60)—52x, 72x, A2x, B2x	
Optional RAID controllers supported	**ServeRAID-M5014**—22x, 32x, 42x, 62x, D2x, G2x, J2x, L2x **ServeRAID-M5015**—22x, 32x, 42x, 62x, D2x, G2x, J2x, L2x		
# of adapter slots total / available	**4** / 3 (RAID adapter installed)		
# of PCIe Gen 2 x16/x8 slots (16GBps)	**1 full**-length/**full**-height		
# of PCIe Gen 2 x8/x8 slots (8GBps)	**2 half**-length/**low-profile** (**1** reserved for RAID card)		
# of PCIe Gen 2 x8/x4 slots (4GBps)	**1 half**-length/**low-profile**		
# of PCI-X/133 slots (1GBps)	None		
# of video ports	1 (rear)		
Video controller	AST 2010 (integrated on iBMC)		
Video memory	8MB SDRAM		
Maximum video resolution	1280 x 1024 x 32-bit color at 75Hz		
Gigabit Ethernet controller	2 dual-port Broadcom BCM5709		
TOE / RDMA / failover / load-balancing-capable	Yes / Yes / Yes / Yes		
# of Gigabit Ethernet ports	4 (rear)		
# of RS485 ports	None		
# of serial ports	1 (rear)		
# of parallel ports	None (USB-attached)		
# of mouse ports	None (USB-attached)		
# of keyboard ports	None (USB-attached)		
# of USB 2.0 ports	5 (2 front, 2 rear, 1 internal for hypervisor)		
Integrated systems management controller	Yes (iBMC)		

x3755 M3 Specifications		
Optional systems management adapter	None	
Light path diagnostics support	Yes	
Predictive Failure Analysis support	Processors, memory, HDDs, fans, power supplies	
Power supply size	1100W universal, autoswitching	
# of power supplies standard / maximum	**1** / **3**—22x, 42x, 62x, B2x, D2x, G2x, J2x, L2x	**2** / **3**—32x, 52x, 72x, A2x
Hot-swap/redundant power supported	Yes (with **2** power supplies for **2** processors; **3** power supplies for **4** processors)—via CTO	
# of fans/blowers standard / maximum	5 / 5 fans (plus one fan per power supply)	
Hot-swap/redundant fans supported	Yes; nonredundant fans available via CTO	
Heat emitted	**648 BTUs** per hour **min**. (**190** watts) at **110** VAC **3753 BTUs** per hour **typical** (**1100** watts) at **110** VAC **5971 BTUs** per hour **max**. (**1930** watts) at **110** VAC **6739 BTUs** per hour **max**. (**2150** watts) at **220** VAC	
Rack mount method	Toolless slides and Cable Management Arm (provided standard)	
Maximum altitude	7,000 ft; 2,133 m	
Operating temperature range	50 – 95º F; 10 – 35º C (up to 3,000 ft / 914.4 m)	50 – 90º F; 10 – 32º C (3,000 ft to 7,000 ft / 914.4m to 2,133m)
Dimensions (HWD) / weight	3.43” (87mm) **H** 17.56” (446mm) **W** 28.64” (727.5mm) **D** (without front panel) 29.4” (747mm) **D** (with front panel)	48.6 (minimum) - 72.7 **lb** (maximum) 22 - 33 **kg**
Operating systems supported	Microsoft Windows Server 2008 R2 (Standard//Web/Enterprise/Datacenter) with and without Hyper-V, Windows PE 3.0, RHEL 5 SE 64-bit with and without Xen, RHEL 6 64-bit, SLES 10 64-bit, SLES 11 64-bit with and without Xen, VMware ESX/ESXi 4.0 and vSphere Hypervisor 4.1	
Length of limited warranty	3 years (parts and labor)[6]	

The Bottom Line

The x3755 M3 is an extremely powerful system that incorporates leading-edge industry-standard features and adds IBM-unique innovations:

Performance

- **High-throughput processors** — Up to four **1.6** to **3.0GHz** 8-to-16-core AMD Opteron 6200 series or up to four **1.7** to **2.3GHz** 8-to-12-core AMD Opteron 6100 series processors—up to **64 processor cores** total (processor-specific)
- **Large cache** — **512KB** of **L2** processor cache; **16MB** or **12MB** of **L3** cache (shared) in all processors
- **HyperTransport Technology** — High-speed access among processors, memory and I/O controllers
- **Fast memory** — Up to **1333MHz PC3-10600 DDR III** ECC memory access, **low latency**, and **two-way interleaving**
- **Large storage capacity** — Up to **24TB** of **hot-swap SAS/SATA** or up to **18TB** (CTO only) of **simple-swap SATA**

[6] For terms and conditions or copies of the IBM Statement of Limited Warranty, call 800-772-2227 in the U.S. In Canada call 800-426-2255. IBM makes no representation or warranty regarding third-party products or services including those designated as ServerProven or ClusterProven. Telephone support may be subject to additional charges. For warranties including onsite labor, a technician is sent after IBM attempts to resolve the problem remotely. International warranty service is available in any country in which this product is sold.

- **Fast disk technology** — Integrated **ServeRAID-M1015 SAS/SATA** controller providing RAID-0/1/10, upgradeable to RAID-0/1/10/5/50 with SED; or integrated **ServeRAID-M5015** SAS/SATA controller with **512MB** of **battery-backed** cache, providing RAID-0/1/10/5/50, upgradeable to RAID-6/60 with SED; optional ServeRAID-5014 SAS/SATA controller
- **Fast communications** — Integrated **two dual-port Gigabit Ethernet** controllers with **TOE/ iSCSI/RDMA** support
- **Fast I/O** — **Four PCIe Gen 2** adapter slots

Flexibility

- High-performance configurations using **two** or **four Opteron** processors
- **Large memory capacity** — Up to **512GB**, using **32** DIMMs (in a four-processor system)
- Up to **eight 3.5-inch hot-swap** SAS or SATA drives, or up to **six** (via CTO only) **3.5-inch simple-swap** SATA drives, as well as support for external iSCSI/FC SANs
- **High-performance external expansion** — **Five** 480Mbps **USB 2.0** ports (two front, two rear, one internal for a hypervisor or tape drive)
- Optional high-performance **RAID** controllers
- **Four** adapter slots:
  - **One x16/x16**[7] **PCIe Gen 2** slot (16GBps)
  - **Two x8/x8**[8] **PCIe Gen 2** slot (8GBps)
  - **One x8/x4**[9] **PCIe Gen 2** slots (4GBps)
- Optional integrated **optical** drive

Manageability, Serviceability and Availability

- **IBM Systems Director** systems management software, including (among others):
  - IBM Systems Director Active Energy Manager
- **Integrated Baseboard Management Controller** (iBMC):
  - **IPMI 2.0** compliance, including highly secure remote power control
  - **Text console redirection** systems management standard
- **Active Memory protection:**
  - Advanced **Chipkill** ECC memory protection, and
  - **Online memory sparing**
- **ServeRAID-M1015** with **RAID-1** disk mirroring and **RAID-10** striped/mirrored arrays, or **ServeRAID-M5015** with **RAID-1/10/5/50** with memory-backed cache standard (model-specific) standard
- Optional **hot-swap/redundant power supplies** (up to 3)
- **Hot-swap/redundant fans** standard
- **Light path diagnostics** (front LED panel, drop-down light path panel)
- **Remote presence** capability
  - Supports **LDAP** and **SSL** industry standards
  - Remote KVM over IP
- **Toolless chassis** and **toolless slide** design; integrated **Cable Management Arm**

Server Comparison Chart

The following table shows the suggested uses for the respective IBM System x rack-optimized servers, including comparisons of the uses for which each server is best suited:

[7] x16 Gen 2 slots can accept x1, x4, x8, or x16 Gen 1 or Gen 2 adapters running at the adapters' maximum throughput.
[8] x8 Gen 2 slots can accept x1, x4 or x8 Gen 1 or Gen 2 adapters running at the adapters' maximum throughput.
[9] x4 Gen 2 slots can accept x1 or x4 Gen 1 or Gen 2 adapters running at the adapters' maximum throughput.

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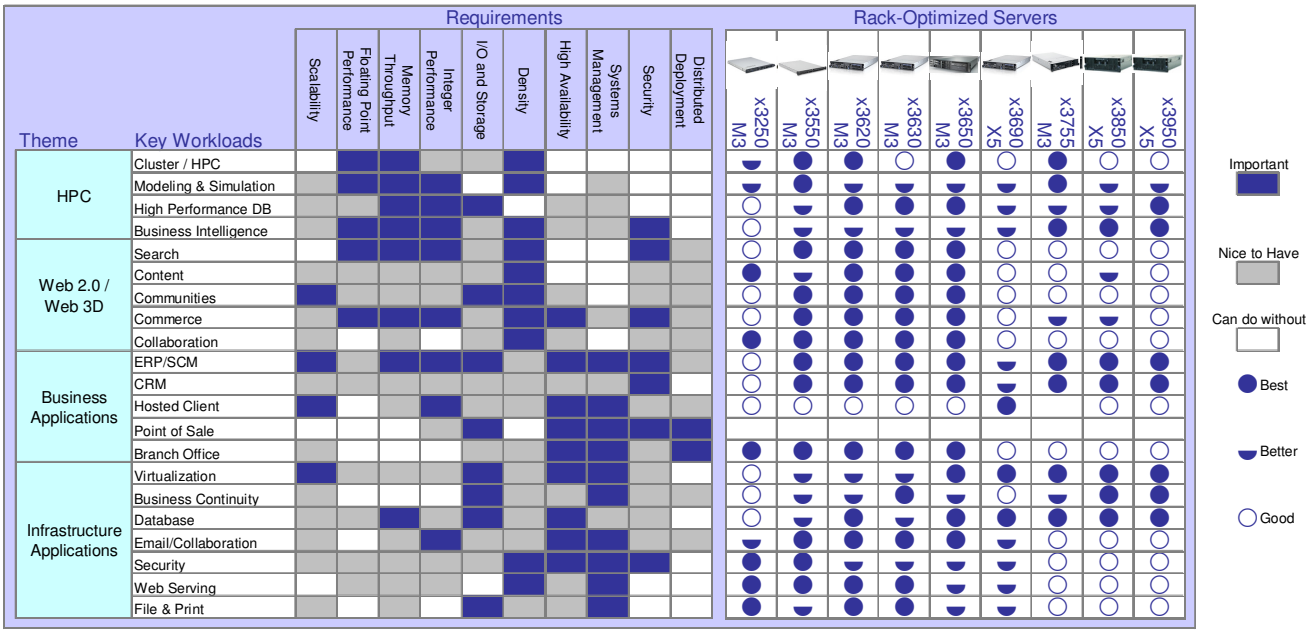
Superior performance/U in a 4-socket, 2U server with up to 64 processor cores



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For More Information

IBM System x Servers and Options	http://**ibm.com**/systems/x
IBM Systems Director Service and Support Manager	http://**ibm.com**/support/electronic
IBM System x and BladeCenter Power Configurator	http://**ibm.com**/systems/bladecenter/resources/powerconfig.html
IIBM Standalone Solutions Configuration Tool	http://**ibm.com**/systems/x/hardware/configtools.html
IBM Configuration and Options Guide	http://**ibm.com**/systems/x/hardware/configtools.html
IBM ServerProven Program	http://**ibm.com**/systems/info/x86servers/serverproven/compat/us
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